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Case Report

Anterior Choroidal Artery Infarction Evaluated with ^{123}I-Imp Single-Photon Emission Computed Tomography and 7 Tesla Magnetic Resonance Imaging

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Anterior choroidal artery (AchA) infarction remains a challenging diagnosis although it was first described almost 100 years prior. N-isopropyl-p-[^{123}I]-iodoamphetamine single-photon emission computed tomography (^{123}I-IMP SPECT) and 7 Tesla magnetic resonance angiography (7T-MRA) are not routinely performed in cases of AchA infarction. Therefore, the application of ^{123}I-IMP SPECT and 7T-MRA for AchA infarction has not been reported previously. A 67-year-old man presented with disturbed consciousness, gaze preference to the left, aphasia, right homonymous hemianopia, and right hemiparesis. Brain magnetic resonance imaging revealed infarction of the left posterior limb of the internal capsule. Left middle cerebral artery was clearly seen on MRA. However, ^{123}I-IMP SPECT on day 13 showed cortical hypoperfusion which indicated thalamus involvement with neural deactivation. Additionally, 7T-MRA on day 15 revealed an intact left AchA suggesting reperfusion. The neurological deficits improved gradually after treatment and rehabilitation. This case demonstrates AchA infarction with cortical hypoperfusion associated with thalamus involvement, which was clarified by performing ^{123}I-IMP SPECT and 7T-MRA. Perfusion analysis and evaluation of detailed vascular anatomy in stroke can be expected to elucidate pathological conditions.

Key Words: Anterior choroidal artery infarction—Monakow's syndrome—thalamus—SPECT—7T-MRA

Introduction

Anterior choroidal artery (AchA) infarction, known as Monakow's syndrome, presents with a classical triad—hemiplegia, hemianesthesia, and homonymous hemianopsia.[1] Differentiation from lacunar infarction of the lenticulostriate arteries is difficult in small lesions. We describe a case of left AchA infarction evaluated with N-isopropyl-p-[^{123}I]-iodoamphetamine single-photon emission computed tomography (^{123}I-IMP SPECT) and 7 Tesla magnetic resonance angiography (7T-MRA).

Case Report

A 67-year-old man with a history of hypertension and lacuna infarctions presented to the emergency department with lethargy, disturbed consciousness, and right hemiparesis. High blood pressure (222/139 mmHg) with normal sinus rhythm was noticed. Right homonymous hemianopia was confirmed by visual threat assessment. Nonfluent aphasia and gaze preference toward the left side were noted. Diffusion-weighted magnetic resonance imaging (MRI) revealed high signal intensity limited to the left posterior limb of internal capsule suggesting acute infarction (Fig 1A). AchA

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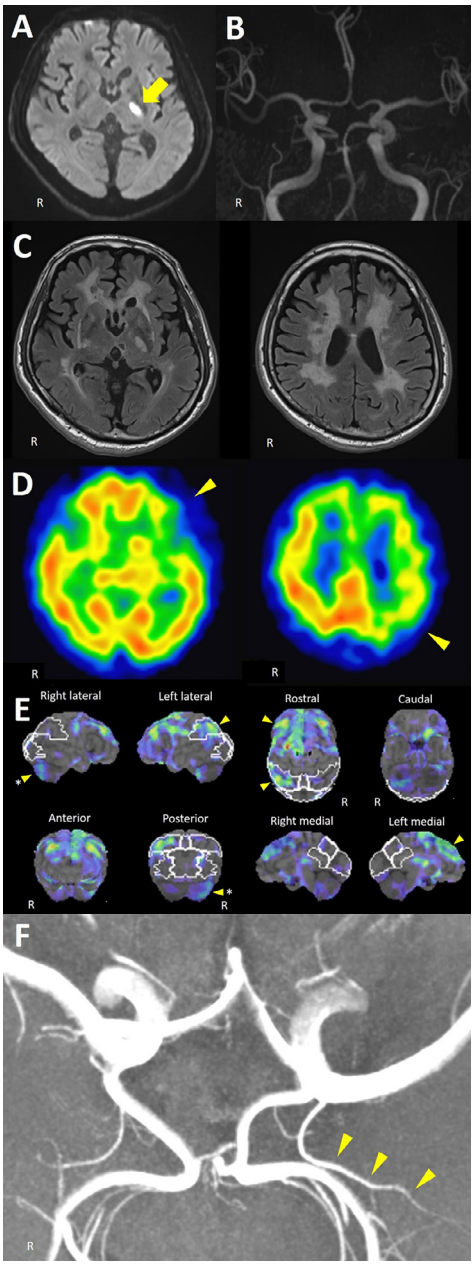

Figure 1. *Brain magnetic resonance imaging (MRI) showing left acute anterior choroidal artery (AchA) infarction and N-isopropyl-p-[123I]-iodoamphetamine single-photon emission computed tomography (^{123}I-IMP SPECT) analyzed with three-dimensional stereotactic surface projection (3D-SSP) showing hypoperfusion in the left frontal and parietal lobes. Diffusion-weighted image on the day of admission revealed high intensity in the left posterior limb of the internal capsule (arrow) (A). 3 Tesla MRA on the day of admission showed intact large arteries, but it was difficult to evaluate the AchA (B). Flair attenuated inversion recovery image on the day of admission indicated old multiple microinfarcts (C). There was no apparent hypoperfusion in the thalamus. However, the hypoperfusion of the left frontal and parietal lobes on ^{123}I-IMP SPECT on the 13th day after admission indicated left thalamus involvement due to left acute AchA infarction (arrowheads) (D). Hypoperfusion in the left frontal and parietal lobes was revealed in 3D-SSP as well (arrowheads). Hypoperfusion in the contralateral cerebellum (asterisked arrowheads) can be explained through crossed cerebellar diaschisis, also known as Monakow's effect (E). High resolution 7 Tesla MRA with isotropic 0.25 mm resolution on the 15th day after admission demonstrated enhanced left AchA (arrowheads) (F).(Color version of figure is available online.)*

infarction was suspected due to the clinical symptoms and posterior limb of internal capsule lesion. Aspirin, clopidogrel, argatroban, and edaravone were administered. ^{123}I-IMP SPECT revealed hypoperfusion in the left frontal and parietal lobes (Fig 1D). 7T-MRA showed an intact left AchA (Fig 1F).

Discussion

The neurological manifestations, including right hemiparesis and right homonymous hemianopia, indicated left AchA infarction involving the pyramidal tract and lateral geniculate body. The lesion responsible for other symptoms such as disturbed consciousness, aphasia, and gaze preference was in the thalamus, according to the blood supply distribution and its corresponding functions.[2]

The frontal and parietal hypoperfusion in ^{123}I-IMP SPECT[3] indicated thalamus involvement with neural deactivation[4] of known connections between the frontal and parietal lobes and the thalamus.[5] Such cortical hypoperfusion revealed via ^{123}I-IMP SPECT in AchA infarction can be a specific finding for AchA infarction.

7T-MRA has higher resolution which helps visualize the arterial inflow signal, and is therefore expected to be useful in the field of stroke.[6,7] The mechanism of AchA infarction is known to be associated with small vessel disease or embolism,[8] and visualization of small vessels is important.[9] The enhanced left AchA on 7T-MRA indicated possible reperfusion. Therefore, we presumed that the embolized AchA was recanalized. This case demonstrated an unexpected pathological condition resulting from focal ischemia, which was revealed by ^{123}I-IMP SPECT perfusion and 7T-MRA, thus indicating the usefulness of these methods for visualizing thinner vessels and identifying the mechanism of stroke.

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